RHEOTANYTARSUS RIOENSIS (DIPTERA: CHIRONOMIDAE), A NEW SPECIES OF THE *PENTAPODA* GROUP FROM THE CANARY ISLANDS

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Rheotanytarsus species of the *pentapoda* group are characterized by the form of two structures of the male hypopygium: the narrow, elongate apices of the gonostyles turned downwards at the tip, and the narrow, gently sinuate or curved appendage 2a. The form of the flattened plates at the tip of appendage 2a appear to be good species discriminators, but these are usually indistinguishable in normal mounts as they project nearly vertically from the shaft of the appendage, are very thin and nearly transparent. In general, in this genus pupal structure provides confirmation of specific identity.

The described west Palaearctic species of the *pentapoda* group are *pentapoda* (Kieffer) and *photophilus* (Goetghebuer). Specimens of all stages of a further species of this group were collected by PDA from an irrigation conduit on Tenerife.

Terminology follows that of Sæther (1980), except that the flattened setae on the pupa are referred to as taeniae (singular taenia, adjective taeniate), a replacement term for the misnomer 'filament'.

Abbreviations used. AR antennal ratio: in adults, ratio of length of apical flagellomere divided by the combined length of the more basal flagellomeres; in larvae, length of basal segment to combined length of the remaining segments. LR leg ratio: ratio of metatarsus length to tibial length. BR bristle ratio: ratio of length of longest seta of tarsal segment 1 divided by minimum width of tarsal segment 1. VR venarum ratio: ratio of length of Cu to length of M.

DESCRIPTION

Holotype male deposited in Zoologische Staatssammlung, Munich; paratypes also in the University of La Laguna, Tenerife, The Natural History Museum, London, and in the authors' collections.

Adult male, total length 2.1–2.7 mm (n = 6). Head including appendages brown, eyes black; thorax brown, scutellum and halteres pale; anterior legs pale at base of femur, progressively more brownish to metatarsus, thereafter brown; posterior legs only weakly darkened to tarsus with tibial combs conspicuously black; abdomen brownish, a little darker posteriad.

Head. AR 0.8–1.2 (m = 1.0, n = 11). 7 or 8 temporal setae; 2 postocular setae; 19–27 clypeal setae. Lengths of palp segments: 30–55, 30–40, 93–130, 103–138, 160–215 μm (n = 9).

Thorax. 7–11 dorsocentral setae (n = 9) extending from anterior edge of dorsiventral muscle attachment to scutellum; occasionally there may be 1–3 additional setae in the humeral area. 20–26 (n = 8) biserial acrostichals ending at mid-thorax. 1 prealar seta. 8 scutellar setae. Wing length 1.46–1.75 mm (n = 8), 3.4–3.7 times as long as broad. Anal lobe absent. Costa not produced. VR 1.32–1.44 (n = 8). Membrane and veins with dense macrotrichia from near base to tip. Legs: lengths (in μm) and proportions (n = 6):

leg	fem	tib	tar 1	tar 2	tar 3	tar 4	tar 5	LR	BR
1	760–830	380–460	780–900	420–470	300–350	270–310	120–150	1.8–2.0	2.2–3.4
2	690–790	500–620	300–350	150–180	110–130	80–100	60–70	1.3–1.5	3.0–5.7
3	760–880	630–750	420–510	260–330	240–270	150–180	85–100	1.2	4.5–6.1

Anterior tibia with a peg-like spur apically; mid and hind tibia with a pair of small apical combs, each with an outwardly curved spur about twice the length of the comb setae.

Abdomen. Tergites and sternites with setae arranged in anterior and posterior transverse bands; a longitudinal lateral row also present on tergites; setal numbers:

tergite:	IV	V	VI	VII	VIII
anterior band	8	7–9	6–10	7–8	8–9
posterior band	11	8–10	9–11	5–10	6–10
lateral row	5	5	5(6)	4	3

sternite:	IV	V	VI	VII	VIII
anterior band	5	5	6–7	6–8	14–15
posterior band	5	7	6–8	6–10	10–14

Hypopygium (Fig. 1). Anal tergite with 6 very short setae spreading forwards from between the anal point combs, 5 or 6 about 18 μm long setae on each side of the anal point base, and 3 slightly longer setae immediately below the anal point. Anal point contracted to the posterior extent of the combs, thereafter slightly swollen to the

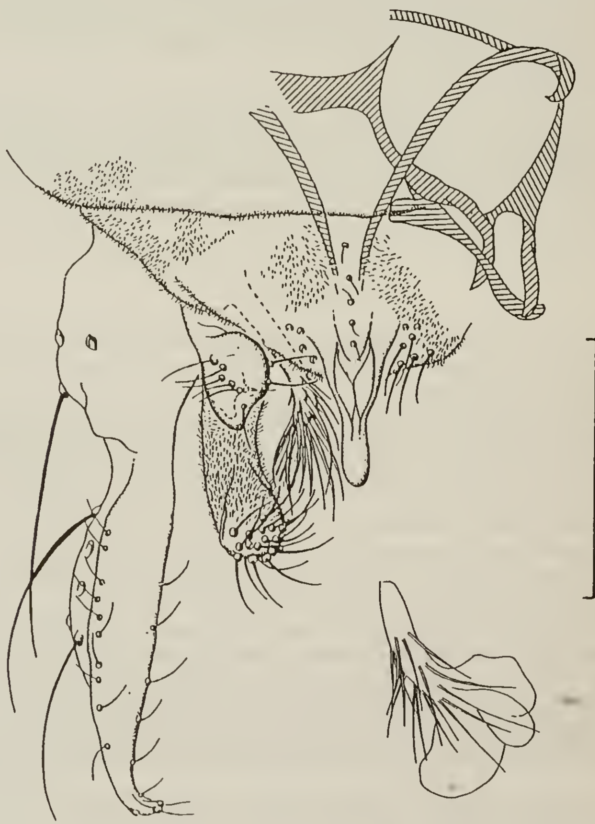

Fig. 1. *Rheotanytarsus rioensis*. Male hypopygium dorsal and appendage 2a lateral. Scale = 0.1 mm.

rounded apex; anal combs high. Gonostyles swollen, contracted strongly in distal quarter, the narrow, gradually narrowing apex bent downwards at tip. Appendage 1 with 2 inner marginal setae, 5 or 6 dorsal setae and 1 ventral seta directed inwards. Appendage 1a peg-shaped, reaching, or not quite reaching, the inner apical margin of appendage 1. Appendage 2 somewhat clubbed apically, where there is a patch of setae dorsally, most of which are curved forwards. Appendage 2a narrow, nearly parallel-sided, with setae on inner margin from near base; at apex with three flat extensions.

Adult female, length 1.7–2.2 mm (n = 6). Colour as in male.

Head. Antennal flagellomere lengths: 70–100, 53–60, 63–68, 58–63, 75–88 μm (n = 5). 6–9 temporal setae. 2 postorbital setae. 21–26 clypeal setae. Lengths of palp segments: 20–35, 30–45, 103–115, 108–120, 166–200 μm (n = 5).

Thorax. Dorsocentral setae: 8–9 from anterior margin of dorsiventral muscle attachment to scutellum; in addition a humeral patch of 3–6 setae connected to the posterior dorsocentrals by one or two intermediate setae. 20–24 biserial acrostichal setae. 1 prealar seta. 8 scutellar setae. Wing (Fig. 2), length 1.44–1.60 mm (n = 5); 3.1–3.4 times as long as broad. Anal lobe slight. Costa not produced. VR 1.4–1.5. Legs: lengths (in μm) and proportions (n = 3):

leg	fem	tib	tar 1	tar 2	tar 3	tar 4	tar 5	LR	BR
1	640–680	380–390	690–740	380	270–280	240	120	1.6–1.7	2.8
2	610–650	420–500	280–290	130–150	100–110	60–80	60	1.3–1.5	3.8–5.3
3	670–700	560–630	380–390	220–240	200–210	120–130	80	1.1–1.2	5.0

Tibial spurs and combs as in male.

Genitalia (Fig. 3). Cerci with a sharp, nearly right-angled point dorsally, gently curved posteriorly and strongly curved ventrally to base. Seminal capsules 70 μm long. Notum 2.1 times as long as seminal capsules. Gonapophysis VIII with ventrolateral lobe broad, weakly rounded, and dorsomesal lobe strongly projecting, smoothly rounded.

Pupa (*Rheotanytarsus* Pe2 Langton 1991), length 3.0–3.9 mm (n = 10). Cephalothorax brownish, somewhat darker anterodorsally, around the base of the wingsheaths and ventrally at the base of the legsheaths; wing sheaths margined with brown. Abdomen very pale brown, laterally darker, these lateral bands intensifying posteriad. Anal segment brown, anal lobes with a median colourless band.

Cephalothorax. Frontal setae and cephalic tubercles absent. Frontal apotome granulate towards apex. Thoracic horn (Fig. 4a) 225–265 μm long (n = 9); 6.6–8.9 as long as broad, without setulae or points. Nose of wingsheaths prominent. Lateral

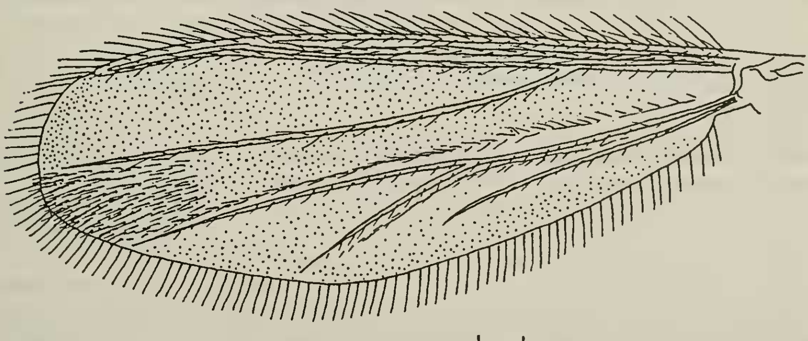

Fig. 2. *Rheotanytarsus rioensis*. Female wing. Scale = 0.1 mm.

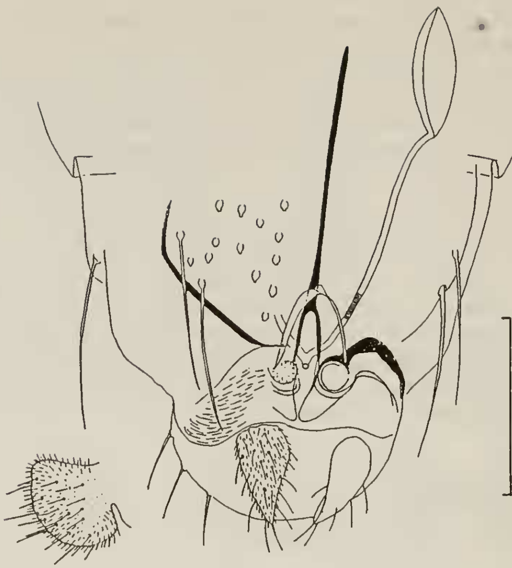

Fig. 3. *Rheotanytarsus rioensis*. Female genitalia ventral and cercus lateral. Scale = 0.1 mm.

antepronotal setae about 80 μm long, narrow taeniate; median antepronotal seta narrow taeniate. Precorneal setae length: 35–40 μm (setaceous); 75 μm (narrow taeniate); 100–160 μm (narrow taeniate). Dorsocentral setae bristle-like; lengths 15–25; 28–50; 15–18; 30–50 μm. Suture with a narrow band of granules along margin.

Abdomen (Fig. 4b). Tergites II–VI with a pair of dark brown point patches anteriorly, twice as broad as long on tergite II, progressively reduced and more circular on following segments; point patches small, e.g. little more than 0.1 length of tergite on IV. Tergites III–V covered with minute shagreen points arranged in more or less transverse rows, less extensive on II; on VI and VII this fine armament is progressively reduced posteriorly; tergite VIII with antero-lateral shagreen patches only. 70–89 hooks in hook row of tergite II. Segment VIII with a single posterolateral brown spur. Chaetotaxy:

	I	II	III	IV	V	VI	VII	VIII	IX
dorsal	3	4	5	5	5	5	5	1	0
lateral	0	3	3	3	3	3	3	3	28–36
ventral	2	4	4	4	4	4	4	1	

Larva, length 3.9 mm. Greenish-pink in life, smudged brownish posteriorly. Head brown, mentum and apices of mandibles dark brown.

Antenna (Fig. 5e), segments 80, 23, 7.5, 5, 5 μm long; AR 2.0. Antennal seta on first segment at 0.55–0.7 from base; ring organ at base of first segment; blade about as long as second segment, accessory blade about half as long as blade. Lauterborn organs on segment 2 reaching tip of antenna. Mentum (Fig. 5d) with anterior outline weakly convex: teeth generally very worn (Fig. 5a); median tooth simple, weakly shouldered laterally; the inner four of the five lateral pairs of teeth about equal in size, the outermost much smaller. Ventromental plates (Fig. 5d) about six times as

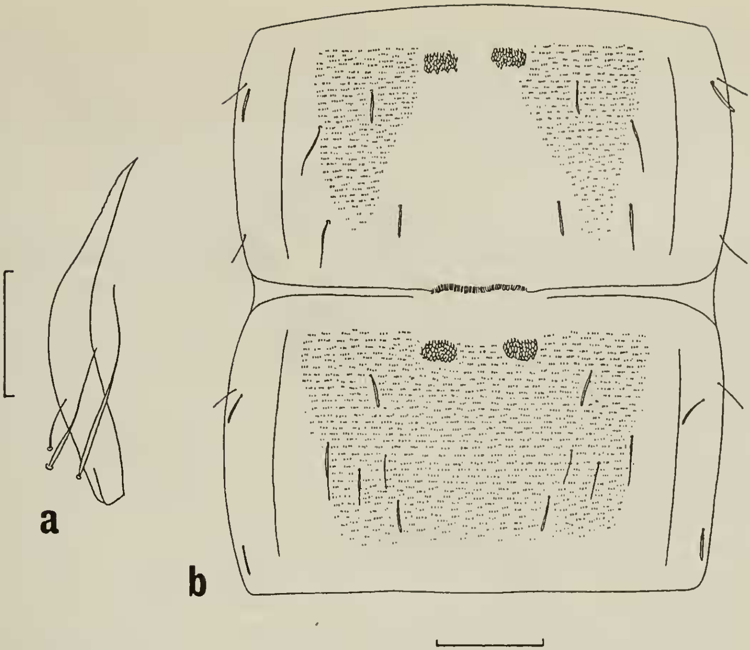

Fig. 4. *Rheotanytarsus rioensis*. Pupa: a. thoracic horn and precorneal setae, b. abdominal segments II and III dorsal. Scale = 0.1 mm.

wide as long, nearly touching medially. Mandibles (Fig. 5b) with outer tooth extending as far as inner apical tooth; three inner teeth. Labrum (Fig. 5c), labral lamella with about 24 teeth, pecten epipharyngis undivided, with about 16 teeth. Maxillary palp as in Fig. 5f.

Systematic considerations

The hypopygium of only one previously described *Rheotanytarsus* species possesses appendage 1a (digitus) in common with *rioensis*: an African species, *ororus* Lehmann (Lehmann, 1979). It is, however, not a member of the *pentapoda*-group, for its styles are not markedly narrowed and bent downwards at their tips. (The generic description and key in Cranston *et al.* (1989) require emendation to include the presence of appendage 1a in some species.) The pupa of *rioensis* is similar to that of *pentapoda* (Langton, 1991), but differs from all previously described *Rheotanytarsus* in the extensive shagreen of many of the abdominal segments, necessitating emendation of the generic description in Pinder & Reiss (1986). Very few females and larvae of this genus have been described; those of *rioensis* show no striking differences to allow separation.

Ecology

Known only from Tenerife, Canary Isles.

Adults were collected from a swarm over an open conduit on 15.xii.1983 in Barranco del Rio at an altitude of 480 m. Subsequent collections at the same place on 14.xii.1985 included adults (males and females) and pupae with associated larvae. The conduit

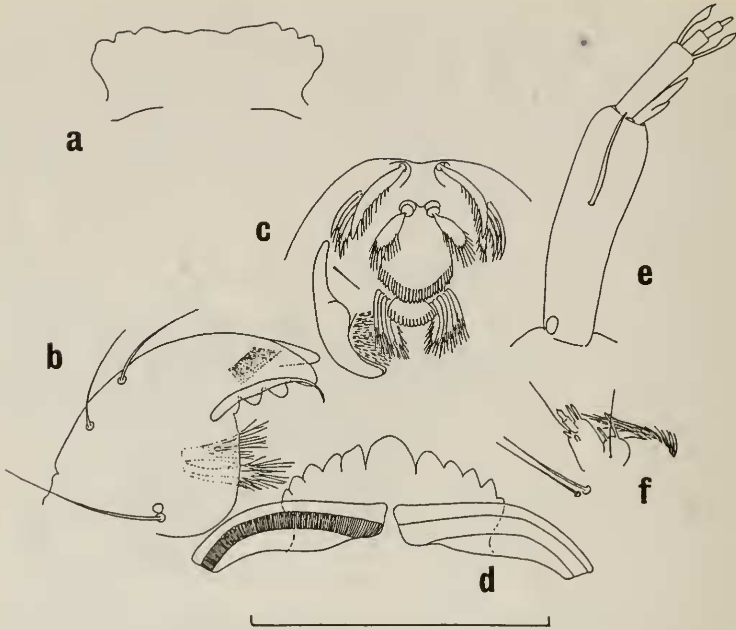

Fig. 5. *Rheotanytarsus rioensis*. Larva: a. characteristically worn mentum, b. mandible, c. labrum, d. mentum and ventromental plates, e. antenna, f. maxillary palp. Scale = 0.1 mm.

was rectangular in cross-section, about 0.6 m wide with a water depth of about 0.25 m. The water velocity was between 0.5 and 1.0 m s^{-1}. Algae covered the sides and base of the conduit which had no loose substratum.

Two other species of Chironomidae were also found at the same site: *Paratrichocladius rufiventris* (Meigen) and *Cricotopus vierriensis* Goetghebuer.

Two further records of this species are known from collections made by Malmqvist *et al.* (1993) in riffles in the natural stony bottomed stream in Barranco del Rio at an altitude of 1450 m on 2.xi.1991 and in the stream Ijuana at an altitude of 770 m on 16.iv.1991. The specimens were identified from pupal material.

Acknowledgements

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BOOK REVIEW

Insect conservation biology by M. J. Samways. London, Chapman & Hall, 1994, xvi + 358 pages, hardback, £37.50.—The growing popularity of conservation in western countries has not been matched by a public awareness of the nature and relative scale of the damage that human activities inflict on different forms of wildlife. Vertebrate taxa receive most of the attention, but this book assembles a body of compelling evidence to show that the risk of extinction is greater for insect species, not only because there are immensely more of them, but also by virtue of their often exacting habitat requirements. The first chapter illustrates the evolutionary adaptation of insects to almost every terrestrial ecosystem. The author draws on some interesting data; for example in a survey of Seram rainforest, over half the estimated 43.3 million individual arthropods in one hectare were Collembola, reflecting the importance of habitats in the soil. The very success of insects, which has produced perhaps 10 million extant species, belies the vulnerability of many species which are so closely adapted to geographically restricted biotopes that even a slight change can wipe them out, often to the point of total extinction. In the tropics, both the diversity of species and the threats to them may seem to make British conservation issues pale into insignificance. However, despite our relatively small insect fauna, our ratio of species to land area appears to be surprisingly high by world standards.

The remaining introductory chapters describe the many ways in which insect habitats have been damaged, while also outlining the aims and responsibilities of national and international organizations which seek to ameliorate this loss. A central problem, which has a chapter of its own later in the book, is the fragmentation of biotopes. This is less serious for relatively mobile animals, especially birds, whose requirements often seem uppermost in the minds of those who influence conservation policy. Fragmentation prevents species from re-colonizing suitable sites following chance local extinctions. In the longer term it could also prevent species from keeping pace geographically with climate change or other large-scale events (as many did during past glaciations). When fragmentation and other problems are viewed in the context of tropical ecosystems, current conservation efforts seem inadequate in scale and often inappropriate in emphasis.

The author goes on to examine ways in which conservation could become more effective by taking proper account of insect population ecology. The ability of species to disperse in a fragmented landscape must be understood in order to determine the optimum size and shape of reserves and the value of different types of 'corridor' between otherwise isolated habitats. He stresses the need to think about very small-scale 'micro-sites' within biotopes, which are essential for survival. Studies on single species show that their different developmental stages and sometimes the two sexes have greatly different micro-site requirements. This does not necessarily mean that we must tinker with sites to help favoured species, since a broader-brush management of the landscape can achieve diversity in a way that is compatible with the economic use of the land.

Although there are still places where the protection of natural ecosystems is the main objective of conservation, there are many other parts of the world where the